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ABSTRACT

This overview of the programs, activities, and facilities relating to computer-based education at the Ontario Institute for Studies in Education (OISE) includes, (1) a brief account of the history and mission of OISE; (2) a description of the OISE Computer Applications Department and its merger with the Department of Measurement and Evaluation in 1976; (3) a summary of courses in Computer Applications offered through OISE; (4) a discussion of the computing and other related educational technology resources and facilities, and the uses to which these are put at OISE; (5) an outline of the relationship between the Educational Computing Organization of Ontario (ECOO) and OISE; and (6) a description of the types of positions accepted by OISE Computer Applications program graduates. Two figures accompany the text. (JL)

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GRADUATE STUDIES IN COMPUTER-BASED EDUCATION AT THE ONTARIO INSTITUTE FOR STUDIES IN EDUCATION

by

Irvin Rubincam

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GRADUATE STUDIES IN COMPUTER-BASED EDUCATION AT THE ONTARIO INSTITUTE FOR STUDIES IN EDUCATION

Irvin Rubincam

The Ontario Institute for Studies in Education has been offering a graduate program in Computer Applications in Education since 1967. Over this 14 year period, 140 graduate degrees in computer applications have been granted.

The number of graduates in each degree program is:

Master of Education	107
Master of Arts	21
Doctor of Education	1
Doctor of Philosophy	11

Before giving more details concerning this graduate program, it would be useful to explain briefly some of the unique characteristics and administrative structures of the Ontario Institute for Studies in Education, or 'OISE', or 'the Institute', as it is referred to in Ontario.

OISE was founded in 1965. It is affiliated with the University of Toronto and is in fact the Graduate Department of Education. Graduates of OISE receive University of Toronto degrees. OISE, however, has its own governing structure, a Board of Governors with representatives from

the Institute, the University of Toronto, the Ontario Teachers' Federation, and citizens of Ontario.

One of the unique features of OISE, built into its original charter, is its multiple functions of graduate instruction, research, and field development. It was hoped that combining these three functions in one institution would bridge the traditional gap between theoretical research and applications in the real world of limited budgets, overworked teachers and unruly students. In addition, it was hoped that graduate students would benefit from exposure to, and involvement in, the research and development activities of the Institute. With regard to the Computer Applications Department, I believe this tripartite arrangement has worked out well and I will elaborate on this shortly.

Given this OISE overview, let's take a brief look at the Computer Applications Department from its inception in 1967 to the present, and follow with a discussion of the current program and its future directions.

In 1967, the activity in educational computing, such as it was, was centered largely at the post-secondary level. Therefore, it was somewhat visionary to create an entire department of Computer Applications to Education. Dr. Les McLean was instrumental in setting up the program and served as the Chairman of the Department from 1967 to 1975. In the late 1960's, work began on what has come to be called the

CAN CAI project (CAN, by the way, stands not for CANada but for Completely Arbitrary Name).

This project, under the leadership of Dr. William Olivier, has developed, over the past decade, semester-length courses in mathematics and science at the community college level(1) and, more recently, mathematics courses at the secondary level(2). During this time over 100,000 students have taken these courses. This project perhaps as well as any illustrates the three functions of the Institute (teaching, research and development) working cooperatively. The major component of the CAN project is of course, developmental. In conjunction with building the CAI courses, the project has developed a complete CAI support system including user registration, record keeping and analysis, report generation facilities, a course authoring language, and a communications network. Students in Computer Applications courses have made extensive use of the CAN CAI system. A course in instructional programming uses the CAN-7 authoring language. Students also study the techniques used in developing the CAN courses - for example, procedures for determining the proper sequential order of the subject matter, testing strategies, record keeping and reporting functions. A number of dissertations have been based upon data collected in association with the CAN CAI project. Here is a representative sample of thesis titles spanning the decade of development:

1973 The time factor in computer assisted instruction
- Zoltan Dienes

1977 The interaction of learner and degree of learner control in CAI
- Pat Bachor

1979 A multilingual interpreter system for languages used in computer-assisted instruction
- Stan Voyce

In 1976 the Computer Applications Department merged with the Department of Measurement and Evaluation and became known as the Department of Measurement, Evaluation and Computer Applications (or MECA for short). The rationale for this merger was based largely on the economy of scale in forming a single administration of what was formerly two small departments within the Institute. The subject areas are not incompatible however, and considerable sharing of ideas to the mutual benefit of both groups has taken place. Several of the faculty members regularly teach courses in both measurement and evaluation, and computer applications.

Recently, the expertise from each side of the department has been combined in a large scale study of the Ontario Assessment Instrument Pool (OAIP). The Provincial Government has, for several years, been funding the development of banks of 'assessment instruments' in most of the major subject areas of the curriculum. The MECA department was contracted to conduct field trials of the English pool and the mathematics pool (which had previously been developed by the CAN CAI project). The project staff employed a number of innovative techniques for improving the

validity of large scale assessments of educational systems, including sequential probability testing to estimate the frequency with which errors occurred in data entry to the computer.(3)

Computer applications then is an area of study which can (one might even say must) form affiliations with other disciplines or departments within a graduate school of education. It is not inconceivable that a merger with either the Curriculum or Applied Psychology Departments at OISE would also have achieved the same degree of success. The theses topics selected by Computer Applications students have frequently been directed toward disciplines other than computer science. Here is a representative sample of theses which illustrate this point:

> The Application of Computer-Assisted Instruction to Foreign Language Teaching
> - Gary Cole
>
> A Study of Problem Solving Strategies Using A Computer-based Music Laboratory
> - Blanche Bante
>
> A Modification of Lord's Model for Tailored Tests
> - Jerry Mussio
>
> Systems based on Individualized Learning in Early Childhood
> - Nasim Khan

Therefore, it is not surprising to observe that some of the Computer Applications courses are of the form 'computers applied to some area of educational expertise'. (Table 1 lists the computer applications courses currently being offered).

TABLE 1

Course offerings in Computer Applications in the Department of Measurement, Evaluation and Computer Applications of the Ontario Institute for Studies in Education.

1500 COMPUTERS AND INDIVIDUALIZED INSTRUCTION

1501 COMPUTER-GUIDED INSTRUCTION

1503 INTRODUCTION TO COMPUTER APPLICATIONS IN EDUCATION

1505 INSTRUCTIONAL PROGRAMMING

1515 COMPUTERS IN THE CURRICULUM

1516 PROGRAMMING APPLICATIONS IN ONTARIO CURRICULA

1517 PERSONAL COMPUTING AND EDUCATION

1520 PROCESSING EDUCATIONAL RESEARCH DATA

1525 THE COMPUTER IN EDUCATIONAL ADMINISTRATION

1551 SPECIAL TOPICS IN COMPUTER APPLICATIONS: MASTER'S LEVEL

1552 INDIVIDUAL READING AND RESEARCH IN COMPUTER APPLICATIONS: MASTER'S LEVEL (Pass/Fail)

3500 RESEARCH SEMINAR IN INTERACTIVE SYSTEMS FOR EDUCATION

3517 EVALUATION AND MICROCOMPUTER-BASED CURRICULA

3535 SIMULATION MODELS OF COGNITION AND LEARNING

3551 SPECIAL TOPICS IN COMPUTER APPLICATIONS: DOCTORAL LEVEL.

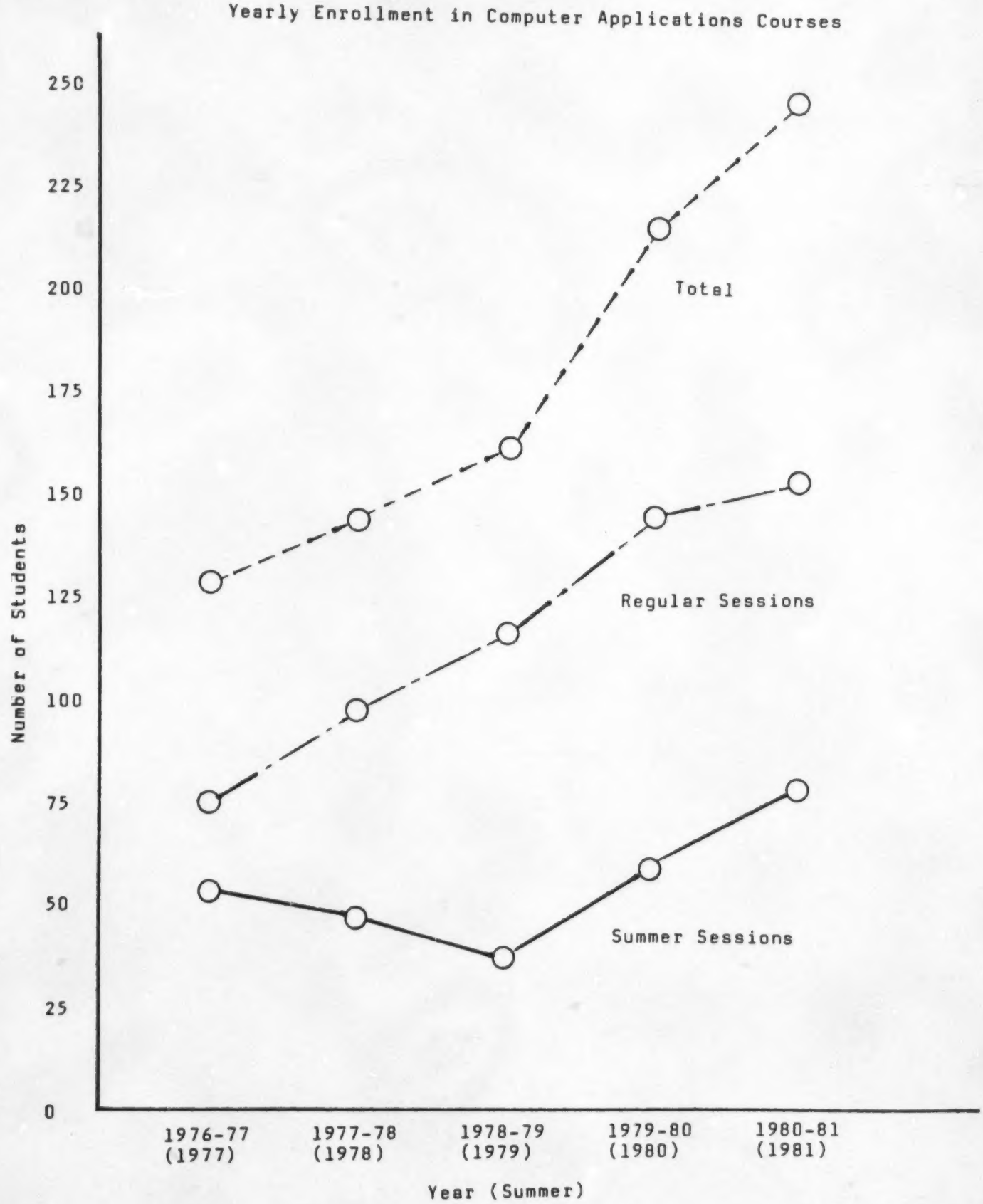
3552 INDIVIDUAL READING AND RESEARCH IN COMPUTER APPLICATIONS: DOCTORAL LEVEL (Pass/Fail)

3556 RESEARCH SEMINAR ON INFORMATION PROCESSING IN EDUCATION (Pass/Fail)

At the introductory level (1500 courses), five (1500, 1501, 1503, 1505 and 1517) could be considered the core curriculum in computer applications. Four others (1515, 1516, 1520 and 1525) deal with the application of computers in other areas (curriculum, educational research, and educational administration). At the more advanced level of 3500 courses, 3535 draws heavily on the area of cognitive psychology and learning theory.

During the past year, the current Computer Applications program has been under internal review. Increased enrollments have put a considerable strain on staff and resources, particularly in the part-time M.Ed. program, as teachers in the field seek to upgrade their skills and knowledge in computer applications (see Figure 1). Prerequisite computer skills have not traditionally been required to enter the Computer Applications program. Students without previous computer knowledge have been required to take 1503 - Introduction to Computer Applications in Education. This course, as a basic introduction to computer literacy, has served a useful function, but the question has been raised as to whether graduate credit should be given for such a course. The decision of the Department has been to move the skills training part of the course (e.g. learning to program in BASIC, learning a word processing system) into non-credit short prerequisite courses and seminars. This decision is based in part on the realization that MECA, with its limited

Figure 1


Yearly Enrollment in Computer Applications Courses
250
225
200
175
150
125
100
75
50
25
0
Number of Students
Total
Regular Sessions
Summer Sessions
1976-77 (1977)
1977-78 (1978)
1978-79 (1979)
1979-80 (1980)
1980-81 (1981)
Year (Summer)

staff and resources, can not and should not attempt to provide entry level computer skills training for the large and growing number of teachers who desire this knowledge, but should instead concentrate on training specialists in computer applications who, among other things, can serve as trainers themselves.

I'd like to now turn my attention to the computing facilities and resources which are available for our staff and students, since this has an influence upon the type of graduate program offered. I want to say right off that we don't have a PLATO system (as nice as that might be). What we do have are the following:

A DEC-10 main frame computer

A Honeywell Level 6 minicomputer

A classroom of Commodore Pets

The DEC-10 is of course, the workhorse of the Institute and handles administrative, word processing, data analysis and well as instructional tasks. One of the unique features of this system is a classroom of terminals connected to the DEC-10 which can function in a manner similar to a language laboratory. (Figure 2 illustrates how this works.)

The classroom can function as 9 separate terminals all doing independent things, or the instructor can view on his or her terminal what is occurring at a student's terminal, or all students on their terminals can see what is occurring on a particular terminal. This facility can be used to an

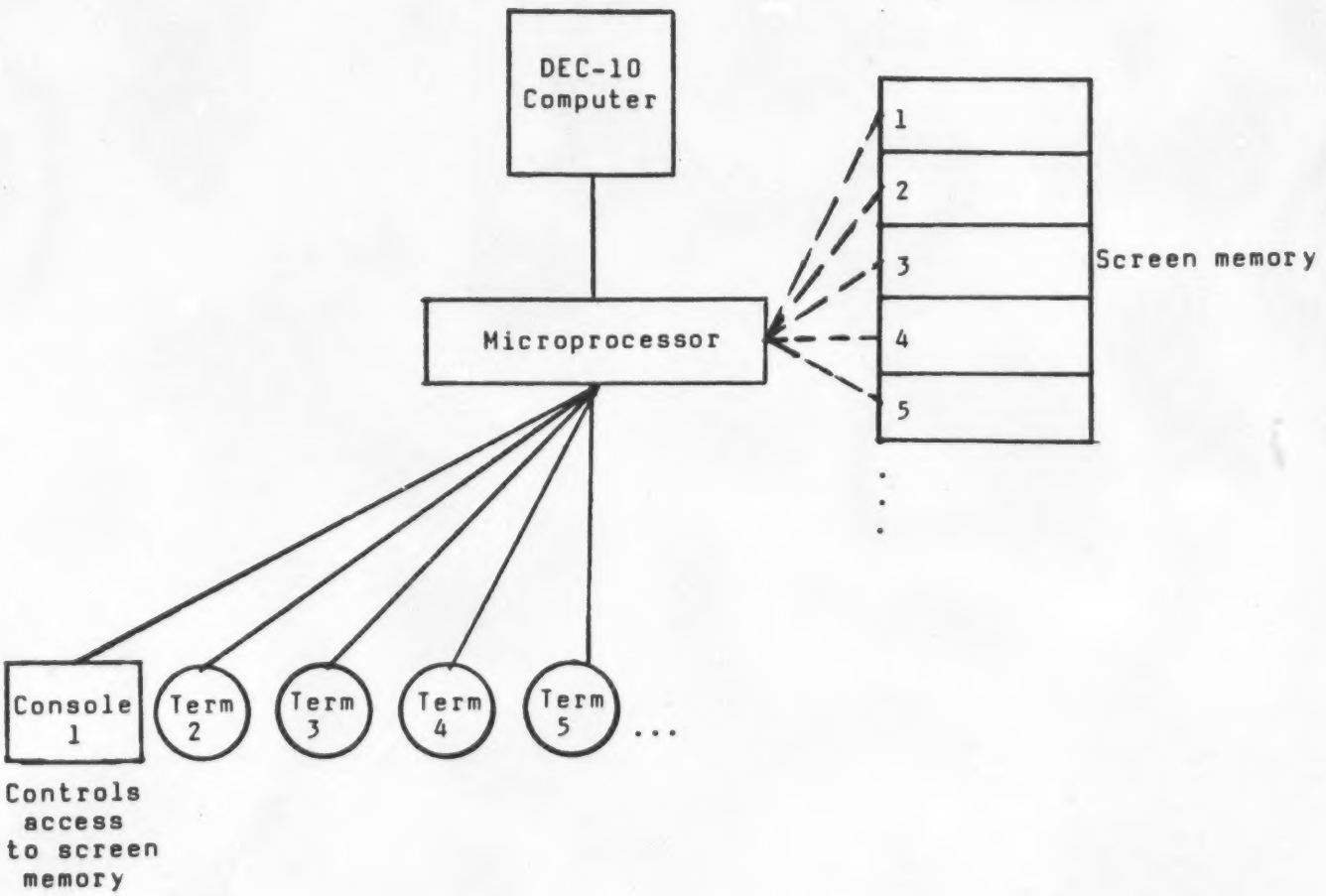


Figure 2

Computer classroom (developed by Dr. Robert McLean, OISE)

excellent advantage in class discussions on programming assignments, evaluation of courseware, etc.

The Honeywell Level 6 minicomputer is used as a dedicated machine to run the CAN CAI system (which I discussed earlier). It is also being used as a developmental machine for a video disc project currently underway in the Department (which I will discuss shortly).

The microcomputer facilities are somewhat limited at the moment. The decision to purchase Commodore Pets was prompted in part by the fact that this microcomputer is the current de facto standard within Ontario (80-90% of the micros in the elementary and secondary schools are Pets) and the fact that we also couldn't resist their 3 for the price of 2 sale. This situation is likely to change in the near future. The Ministry of Education has declared that it intends to solve the problems of hardware and software compatibility once and for all through the development of a Canadian Educational Microcomputer. The design process is well underway and we expect to be giving our students access to the first prototypes this fall.

Another piece of hardware to which the MECA students have access is the video disc. MECA is in the second year of a multimillion dollar project to develop the procedures for producing video discs in the area of technical training. Ontario is currently experiencing a shortage of skilled tradespersons and the provincial government is looking for

ways to reduce the substantial costs of the necessary training programs. Technology, and in particular the computer controlled video disc, is being seriously considered as a cost-effect training method. Two of the MECA Ph.D. candidates are working with this project and planning their thesis research around data generated by the field trials of the video disc materials.

The Ontario government is also concerned about the role the Ministry of Education might or should play in the evaluation of educational computer programs. A mechanism for evaluating and authorizing the use of textbooks has been in place for a number of years. The ministry has created a committee to advise them on how these mechanisms might be applied to educational courseware. Two members of the MECA faculty serve on this committee. MECA students have recently become indirectly involved in this process, by serving as evaluators of an evaluation instrument the Ministry proposes to use to judge the merits of various courseware packages.

I also should tell you something about the Educational Computing Organization of Ontario (otherwise known as ECOO) and the involvement of MECA in its creation and development to this point in time. In September of 1979, a small number of educators met to consider the possibility of forming an organization to "exchange and disseminate information concerning the educational uses of computers in the

province, conduct workshops, and assist policy makers in determining the computing needs of educators". A member of the MECA faculty became the president and another faculty member agreed to serve as the newsletter editor. The money to finance the publication of the first newsletter came from a grant to MECA. This first issue was sent free of charge to all of the universities, colleges, secondary schools and a selected number of the elementary schools in the province. By the end of January 1980, the organization had grown to over 200 members and as of March 1982, membership stands at close to 2000.

MECA's support for ECOO is in the form of a low publication cost for the Newsletter through a subsidized internal rate, free office space, and free use of the Institute for its annual conferences. In return ECOO has helped to further some of the field development goals of MECA and OISE through the role it plays in increasing the level of computer awareness and literacy for educators in the province. ECOO has also provided benefits for the graduate students in MECA. The Newsletter has published a substantial number of articles by MECA (and OISE) students, the committee structure of ECOO has provided students with many opportunities to fill positions of responsibility and leadership, and the annual conferences have brought students in contact with many of the leading computer educators in North America.

I would next like to look at the MECA program in terms of the types of positions which students accept upon graduation. By-and-large, the M.Ed. students who are teachers in the field, stay with their current school boards, although many move into new positions of responsibility with regard to the coordination of computer related activities. They, in effect, become the 'computer experts' in their boards. The students at the M.A. and doctoral levels are more diverse in their backgrounds and equally so in the types of positions they accept.

Here is a representative sample:

One student joined a ministry of education in a provincial government.

One student became a member of a faculty of education.

One joined the research staff of a large urban school board.

One became an educational expert for a large computer company.

Two joined the faculty at OISE, one in special education and the other in computer applications.

One joined a computer science department at a university.

One returned to a position in a university in Ghana.

It is interesting to note, that only one of our graduates to my knowledge has accepted a position whose primary emphasis is educational research. At OISE, funding agencies are willing to give us substantial sums of money for the development of courseware and new teaching

technologies such as the video disc. I'm not aware of any requests from funding agencies that we do more basic research in this field, but that's another topic and outside the scope of this presentation.

In conclusion then, the Department of Measurement, Evaluation and Computer Applications at OISE is growing rapidly with regard to numbers of students. It has in the past, and is now conducting large scale development projects and is looking forward to what lies ahead.

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